

CLAIMS

1. A device or apparatus for manipulating matter at an intended manipulation temperature in a confined or inaccessible space, comprising:

(i) manipulator means at least partly constructed of at least one bent or twisted elongate shape memory alloy members having pseudoelasticity at the intended manipulation temperature, and

(ii) an impermeable barrier member spanning said alloy member(s);

(iii) a hollow housing or cannula capable of initially holding at least the shape memory alloy member(s) in a relatively straightened state, and

(iv) actuating means for extending the shape memory alloy member(s) with said barrier member from the housing to manipulate matter within said space and for withdrawing the shape memory alloy member(s) into the housing, the arrangement being such that the shape memory alloy member(s) bend(s) or twist(s) pseudoelastically in a lateral or helical sense to manipulate the matter on extending from the housing at said manipulation temperature, and the barrier member is sealable and the shape memory alloy member(s) become(s) relatively straightened on withdrawal into the housing at said temperature.

2. A device or apparatus according to claim 1 which is of elongate form for surgical manipulation of matter within a living body, and which has the manipulator means at its distal end with the shape memory alloy member(s) having pseudoelasticity at the temperature to be encountered within that body, and wherein the actuating means is operable from the proximal end of the device.

3. An apparatus comprising a surgical instrument for manipulating an object, said apparatus comprising:

a cannula having a longitudinal bore extending therethrough;

a member, disposed within said longitudinal bore and extendable therefrom, said member having,

(i) a proximal segment, and

(ii) a distal segment coupled to said proximal segment and at least partially constructed of an elastic material, said distal segment assuming a first shape

when extended from said bore and assuming a second shape when withdrawn into said bore;

a distal end structure, at a distal end of said member, including an impermeable barrier member spanning said distal segment for contacting said object to be manipulated; and

handle means, coupled to at least one of said cannula and said member, for manually inserting said member through said cannula to distally extend said distal segment from said bore, and for withdrawing said distal segment into said bore.

6. An apparatus according to claim 3, wherein said distal segment is constructed at least partially of a pseudoelastic shape memory alloy, said distal segment assuming a first shape when extended from said bore and its alloy is in a substantially austenitic phase, and assuming a second shape when withdrawn into said bore and its alloy is stressed to contain more martensite phase.

7. Apparatus according to claim 3, wherein said proximal segment and said distal segment are of unitary construction.

8. Apparatus according to claim 3, wherein said distal end structure and said member are of unitary construction.

37. A surgical device comprising:

(a) a housing; and

(b) a barrier member, the barrier member comprising an elastically deformable loop, and an impermeable barrier membrane spanning the loop;

(c) means for moving said barrier member between a first position wherein the barrier membrane is constrained within the housing, and a second position wherein the barrier membrane is unconstrained by the housing and assumes an expanded memory shape.

38. A device according to claim 37 which comprises a tissue collection pouch, the tissue collection pouch including a mouth portion which can be substantially closed.

40. A surgical device comprising:

(a) a housing; and

(b) a shape memory alloy wire including an impermeable barrier member disposed thereon;

(c) means for moving the wire between a first position wherein the wire is constrained within the housing, and a second position wherein the wire is unconstrained by the housing and assumes an expanded memory shape; and

(d) means for withdrawing the barrier member.

42. A device according to claim 40, wherein said means for moving comprises a drawstring.

43. A device according to Claim 42, wherein the housing and the loop can be separated from the barrier member and drawstring means in use.

44. A remotely operated surgical device comprising:

(a) an elongate housing;

(b) a surgical screen comprising an impermeable elastic material;

(c) means for projection and retracting the surgical screen between a first position wherein the surgical screen is constrained within the housing, and a second position wherein the surgical screen is deployed from the housing and assumes an expanded shape.

45. A device according to claim 44 which comprises an endoscopic device, a catheter, or a laparoscopic device.

46. A device according to claim 44 wherein the surgical screen comprises at least one loop.

47. A device according to claim 46 wherein the surgical screen comprises at least one loop which is spanned by a perforated sheet, or the surgical screen comprises at least two loops, having an area therebetween, said area being spanned by a perforated sheet.

48. A collapsible surgical stone basket disposed within a sheath, comprising means for expandably deploying said basket from said sheath, the basket consisting mainly of a shape memory alloy and having an impermeable barrier member spanning said shape memory alloy.

50. A remotely operated surgical device comprising:

(a) an elongate housing;

(b) a retractor, the retractor comprising at least one elastically deformable loop which is spanned by an impermeable membrane, or wherein at least one impermeable membrane spans an area between two loops, or wherein the retractor comprises at least one finger-shaped member spanned by an impermeable membrane, or wherein an impermeable membrane spans an area between two finger-shaped members; and

(c) means for projecting and retracting the retractor relative to the housing between a first position wherein the retractor is constrained within the housing, and a second position wherein the retractor is unconstrained by the housing and assumes an expanded memory shape.

51. A device according to claim 50 which comprises an endoscopic device, a catheter, or a laparoscopic device.

63. An apparatus according to claim 3 wherein the elastically deformable member(s) is(are) composed of shape memory alloy under the intended conditions of use.

64. An apparatus according to claim 1, wherein the shape memory alloy member is composed of nickel-titanium shape memory alloy.

65. An apparatus according to claim 3, wherein the elastic member(s) is (are) composed of shape memory alloy, said shape memory alloy assumes a first shape in a substantially austenitic phase when extended from the housing or cannula, and assumes a second shape containing more martensitic phase when withdrawn into the housing or cannula.

66. A device according to claim 41 including means for indicating the orientation of the elastically deformable loop when extended from the housing.

67. A device according to claim 41, including means for preventing elastically deformable loop from rotating within the housing or cannula.

68. A device or apparatus according to claim 3 suitable for use as a surgical instrument.
69. An apparatus according to claim 1, further comprising a drawstring for sealing the barrier member.